Main Characteristics
- Atex Approved for zone 0, 1, 2.
- Annular shear mode
  (better than obsolete compression design)
- 10, 50, 100, 250, 500, 1000 mV/g version available
- -55°C to 120 °C (-67°F to 250°F)
- Dual case isolation with Faraday shield
- Submersible version (150 metres).
- Life time hermetic sealing warranty (M12/Mil glass seal connector)

Competitive advantage
- Compare to obsolete compression design, annular shear piezoelectric sensors feature better frequency response, improved base strain, lower noise, smaller size, thermal transient immunity and insensitivity to cable motion. Annular shear mode is also less susceptible to transverse vibrations and better immune to electronic saturation at high frequency.
- Improved dynamic range (thanks to exceptional bias stability) at elevated temperatures.
- Resistant to shock (magnet mounting) thanks to Jfet transistor input.
- ESD and reverse wiring protection.
- The glass seal hermetic connector protects the piezoelectric disc and the electronic from harmful environmental influences, significantly increasing their reliability and lifetime. Sensors with epoxy seal will always leak after few temperature cycles.
- M12 connector offers compatibility with numerous sensors used in automation. M12 overmolded cable assemblies are available from many cable manufacturers around the world. Mil cordset are expensive because they are only available from vibration sensor manufacturer.

Description
The hermetic sealed industrial piezoelectric accelerometer model 101 is designed to monitor the vibration in harsh industrial environment. It uses the industry standard ICPE / IEPE / LIVM 2-wire voltage transmission technique with a 4 mA standard constant current supply. Signal ground is isolated from the mounting surface and outer case to prevent ground loops. Faraday shielding will limit sensitivity to EMC to a minimum. Annular shear mode design will prevent from thermal transient and from spurious signal from high transverse vibrations. Low noise electronic and a temperature compensated design will give you accurate result over the complete temperature range. Large choice of frequency range will help to fit almost every customer requirements. Low frequency accelerometers (A=9, 0) incorporate a low-pass filter within the conditioning electronic. This filter attenuates the sensor mechanical resonance and the associated distortion and overload.

Typical applications
Vibrations measurement in the rugged environments of industrial machinery monitoring. High frequency version monitor the vibration on roller bearing, pumps cavitation, ... Medium frequency version monitor overall vibration on pumps, motors, fans, ... Low frequency model is used in the petrochemical, machine tool, and paper industries for monitoring of slow speed agitators, cooling towers, ... High temperature version is typically used where extra temperature protection is needed, such as the dryer section of a paper machine.

Approvals

Revision History
May 2003 : Released
Dec 2014 : Electronic upgrade
Sept 2016 : Improved case electrical isolation
**Model 101.51**

### Ordering information

To order, specify model number, options, accessories and suffix:

**101.51- AA - B - TT - HH - YY**

**AA : Sensitivity**

<table>
<thead>
<tr>
<th>AA</th>
<th>Sensitivity</th>
<th>10 mV/g ± 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>10 mV/g ± 5%</td>
</tr>
<tr>
<td>3D</td>
<td>3D</td>
<td>10 mV/g ± 10%</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>50 mV/g ± 5%</td>
</tr>
<tr>
<td>5D</td>
<td>5D</td>
<td>50 mV/g ± 10%</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>100 mV/g ± 5%</td>
</tr>
<tr>
<td>6D</td>
<td>6D</td>
<td>100 mV/g ± 10%</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>250 mV/g ± 5%</td>
</tr>
<tr>
<td>7D</td>
<td>7D</td>
<td>250 mV/g ± 10%</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>250 mV/g ± 5%</td>
</tr>
<tr>
<td>8D</td>
<td>8D</td>
<td>250 mV/g ± 10%</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>500 mV/g ± 5%</td>
</tr>
<tr>
<td>9D</td>
<td>9D</td>
<td>500 mV/g ± 10%</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1000 mV/g ± 5%</td>
</tr>
<tr>
<td>0D</td>
<td>0D</td>
<td>1000 mV/g ± 10%</td>
</tr>
</tbody>
</table>

*Note: 7, 9, 0 High pass frequency = 0.2 Hz.*

**Available suffix : N, negative polarity**

**B : Connector**

<table>
<thead>
<tr>
<th>B</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MIL-C-5015, glass seal, Type MS3143 10SL-4P</td>
</tr>
<tr>
<td>2</td>
<td>M12 glass seal, IEC 60947-5-2</td>
</tr>
</tbody>
</table>

**B (CC-DD) : Integral Cable**

<table>
<thead>
<tr>
<th>DD</th>
<th>Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>5(01-DD)</td>
<td>90°C Polyurethane cable</td>
</tr>
<tr>
<td>5(02-DD)</td>
<td>200°C Teflon FEP cable</td>
</tr>
<tr>
<td>5(03-DD)</td>
<td>120°C Radox Halogen Free cable</td>
</tr>
<tr>
<td>5(31-DD)</td>
<td>90°C Polyurethane cable with Temperature output</td>
</tr>
<tr>
<td>5(12-DD)</td>
<td>200°C Teflon FEP cable with Temperature output</td>
</tr>
<tr>
<td>5(13-DD)</td>
<td>120°C Radox Halogen Free cable with Temperature output</td>
</tr>
<tr>
<td>7(01-DD)</td>
<td>90°C Polyurethane cable with stainless steel protection conduit</td>
</tr>
<tr>
<td>7(02-DD)</td>
<td>200°C Teflon FEP cable with stainless steel protection conduit</td>
</tr>
<tr>
<td>7(03-DD)</td>
<td>120°C Radox Halogen Free cable with stainless steel protection conduit</td>
</tr>
<tr>
<td>7(12-DD)</td>
<td>200°C Teflon FEP cable with stainless steel protection conduit &amp; Temp. output</td>
</tr>
<tr>
<td>7(13-DD)</td>
<td>120°C Radox Halogen Free cable with stainless steel protection conduit &amp; Temp. output</td>
</tr>
</tbody>
</table>

**TT : Temperature output.** *(Not available with Mil-C-5015 2 pins connector)*

<table>
<thead>
<tr>
<th>TT</th>
<th>Temperature output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omitted</td>
<td>no temperature output</td>
</tr>
<tr>
<td>0</td>
<td>10 mV/°C. (range +2° to +120°C)</td>
</tr>
</tbody>
</table>

**HH : Housing thread**

<table>
<thead>
<tr>
<th>HH</th>
<th>Housing thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omitted</td>
<td>M6x1</td>
</tr>
<tr>
<td>H7</td>
<td>1/4” 28 UNF-2A</td>
</tr>
</tbody>
</table>

*DD length in metres. Standard length are 2m, 5m, 10m, 15m, 20m, 30m.*
**Model 101.51**

**YY : Explosion proof Agency Approval**
- Omitted ................................................................. no specific agency approval
- Y1 (Atex & IECEx) .................................................. LCIE XXXX
  - Group Category Gaz - Protection .................. II 1 G - Ex ia IIC T4 Ga
  - Group Category Dusts - Protection .. II 1 D - Ex ia IIC T135°C Da
  - Group Mine - Protection ......................... IM1 - Ex ia I Ma
  - AA can be .............. 3, 3D, 5, 5D, 6, 6D, 7, 7D, 8, 8D, 9, 9D, 0, 0D
  - B can be .............................................................. 1, 2
  - B(CC,DD) can be .......... 5(03-DD), 7(01-DD), 7(02-DD), 7(03-DD)
  - & DD ≤ 99
  - TT can be .......................................................... Omitted
  - HH can be .......................................................... Omitted or H7
- Y5 (CSA Approval) ................................................ Not Released
  - IS Class 1, Division 1, Groups A to D
  - Ex ia IIC / Class I, Zone 0 AEx ia IIC T4
- AA Options can be ........................................ Same as Y1 (Atex)

**OEM or Customer Engraving :**
- Add ZXX at the end of the part number.
- XX is a number supplied by VibraSens.
- Customer Engraving is not allowed for Explosion proof sensor.
- OEM should contact VibraSens if they need custom Engraving for Explosion proof sensor.

**In stock Model**

**Metric connector**
- 101.51-6D-2 100 mV/g ±10% general purpose version
- 101.51-6-2 100 mV/g ±5 %, general purpose version
- 101.51-9-2 500 mV/g ±5 %, low frequency version
- 101.51-3-2 10 mV/g ±5 %, high frequency version
- 101.51-6D-2-T0 100 mV/g ±10 %with temperature output

**American/UK connector**
- 101.51-6D-1-H7 100 mV/g±10% (1/4”28UNF housing thread)
- 101.51-6-1-H7 100 mV/g±5 % high temp. version (150°C)
- 101.51-9-1-H7 500 mV/g±5 % low frequency version
- 101.51-3-1-H7 10 mV/g 5 % high frequency version

**Available Model with short lead time (1 week)**
- 101.51-6D-5(01-Length) integral polyurethane cable
- 101.51-6D-7(02-Length) integral 200°C stainless steel overbraid teflon cable

**Obsolete Part number compatibility**
- 101.21-6 is replaced by 101.51-6D
- B=3 : M12 epoxy seal connector is obsolete. B=2 should be ordered.

**Ordering example :**
- 101.51-6D-2: Premium accelerometer, 100mV/g, M12 glass seal connector
- 101.51-6D-7(02-05): Premium accelerometer, 5 metres Integral teflon cable with Stainless steel overbraid.
Specifications (24°C)

Dynamic

Frequency response (Typical curve). See Fig. 1. & 2.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Frequency Range</th>
<th>±10%</th>
<th>±3 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>A=3X</td>
<td>1 to 10000 Hz</td>
<td>±10%</td>
<td>±3 dB</td>
</tr>
<tr>
<td>A=6X</td>
<td>1 to 9000 Hz</td>
<td>±10%</td>
<td>±3 dB</td>
</tr>
<tr>
<td>A=9X</td>
<td>0.4 to 1600 Hz</td>
<td>±10%</td>
<td>±3 dB</td>
</tr>
<tr>
<td>A=0X</td>
<td>0.4 to 1600 Hz</td>
<td>±10%</td>
<td>±3 dB</td>
</tr>
</tbody>
</table>

Mounted Resonant frequency

<table>
<thead>
<tr>
<th>Mode</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>A=3X</td>
<td>35 kHz</td>
</tr>
<tr>
<td>A=5X, 6X</td>
<td>25 kHz</td>
</tr>
<tr>
<td>A=9X, 0X</td>
<td>16 kHz</td>
</tr>
</tbody>
</table>

Dynamic range

<table>
<thead>
<tr>
<th>Mode</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A=3X</td>
<td>800 g pk.</td>
</tr>
<tr>
<td>A=5X</td>
<td>160 g pk.</td>
</tr>
<tr>
<td>A=6X</td>
<td>80 g pk.</td>
</tr>
<tr>
<td>A=9X</td>
<td>16 g pk.</td>
</tr>
<tr>
<td>A=0X</td>
<td>8 g pk.</td>
</tr>
</tbody>
</table>

Transverse response sensitivity (20Hz, 5g)

<5%

Temperature response

see fig3

Linearity

±1% Max

Warm up time

<table>
<thead>
<tr>
<th>Mode</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A=3X, 5X, 6X</td>
<td>&lt; 1 Sec</td>
</tr>
<tr>
<td>A=9X, 0X</td>
<td>&lt; 10 Sec</td>
</tr>
</tbody>
</table>

Temperature Output (Option T0)

Only available if sensor is powered via IEPE

Output (between - and Temp)

0VDC at 0°C

Vout=10mV/°C * Temp.(°C)

Range: +2° to 120°C

Electrical

Electrical Grounding

Isolated from machine ground

Internal Faraday shielding

Isolation (Case to shield)

100 MΩ Min

Capacitance to ground

70 pF Nom

Output impedance

50 Ω Nom

DC output bias, 4mA supply (AA=3X, 5X, 6X)

12 VDC Nom

DC output bias, 4 mA supply (AA=9X, 0X)

10 VDC Nom

Residual noise (24°C): A=3X (10 mV/g)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hz</td>
<td>200 ug /√ Hz</td>
</tr>
<tr>
<td>10 Hz</td>
<td>30 ug /√ Hz</td>
</tr>
<tr>
<td>100 Hz</td>
<td>10 ug /√ Hz</td>
</tr>
<tr>
<td>1000 Hz</td>
<td>10 ug /√ Hz</td>
</tr>
</tbody>
</table>

Residual noise (24°C): A=6X (100 mV/g)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Hz</td>
<td>30 ug /√ Hz</td>
</tr>
</tbody>
</table>
### Model 101.51

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Residual Noise (24°C)</th>
<th>( \frac{\mu g}{\sqrt{Hz}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>A=9X (500 mV/g)</td>
<td>6</td>
</tr>
<tr>
<td>100 Hz</td>
<td>A=9X</td>
<td>5</td>
</tr>
<tr>
<td>1000 Hz</td>
<td>A=9X</td>
<td>5</td>
</tr>
</tbody>
</table>

Residual noise (24°C) : A=9X (500 mV/g)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Residual Noise (24°C)</th>
<th>( \frac{\mu g}{\sqrt{Hz}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>A=0X (1000 mV/g)</td>
<td>20</td>
</tr>
<tr>
<td>1 Hz</td>
<td>A=0X</td>
<td>5</td>
</tr>
<tr>
<td>10 Hz</td>
<td>A=0X</td>
<td>1</td>
</tr>
<tr>
<td>100 Hz</td>
<td>A=0X</td>
<td>0.5</td>
</tr>
<tr>
<td>1000 Hz</td>
<td>A=0X</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Residual noise (24°C) : A=0X (1000 mV/g)

**Power requirements**

- **Constant current**: +2 to +10 mA DC
- **Voltage**: +22 to +28 VDC

**Protection**

- **Overvoltage**: Yes
- **Reverse polarity**: Yes
- **ESD Protection**: > 40 V

### Environmental

**Temperature, operating continuous**: 101.51 (max. current =4mA)

- A= 3X, 5X, 6X: -55 to 120 °C (-65 to 250 °F)
- A=9X: -55 to 90 °C (-65 to 212 °F)
- A=0X: -55 to 70 °C (-65 to 158 °F)

**Humidity / Enclosure**

- B=1, 2: Not affected, hermetically sealed, 1E-8 torr.l/s
- B=5, 7, 8: IP68, epoxy sealed

**Acceleration limit**: Shock 5000 g peak

**Continuous vibration**: 500 g peak

**Base strain sensitivity**: 0.0002 g pk/u strain (AA=6D)

**Temp. transient sens.** (3Hz, LLF, 20dB/dec): 5 mg/°C (AA=6D)

**Acoustic sensitivity** (164 dBSP): 0.5 mg (AA=6D)

**Electromagnetic sens.** (50Hz, 0.03 T): 0.2 g (AA=6D)

### Physical

**Design**: Ceramic, annular shear mode

**Weight with connector**

- A=3: 80 gr Nom (2.8 Oz)
- A=5, 6: 85 gr Nom (3.0 Oz)
- A=9, 0: 95 gr Nom (3.4 Oz)

**Weight with Integral cable**: add sensor weight above + …

- BB=5(CC-DD): 40 gr/m
- BB=7(CC-DD): 60 gr/m
- BB=8(CC-DD): 105 gr/m

**Material**: AISI 316L, DIN 1.4404 (Stainless steel)
Mounting torque (M6, M7, M8 suffix) 2.4 N.m (21 in-lbs)

**European Directive**

EMC Directive 2014/30/EU
Standards 61326-1
RoHS Directive 2011/65/EU
Certificate 101.51-YN_Rohs2

**Atex & IECEx Approval (YY=Y1)**

Atex Directive 2014/34/EU
Standards EN 60079-0, Atex General
EN 60079-11, Intrinsic safety, Gas, Dusts
IEC 61241-0, Atex General
IEC 61241-11, Intrinsic safety, Dust
Certificate LCIE ATEX XXX
IECEx XXXXXX
Installation Drawing 101.51-Y1-IMI
EU Declaration of Conformity 101.51-Y1_EUDC

**Accessories, supplied**

Calibration supplied Sensitivity (5g, 160 Hz)

**Accessories, not supplied**

Cable assembly B=1 (Mil connector)
- Polyurethane cable (90°C) 10.01-A01-B22-06-Length
- FEP Teflon cable (200°C) 10.01-A01-B22-02-Length

Cable assembly B=2 (M12 connector)
- Polyurethane cable (90°C) 10.01-A01-E02-31-Length
- FEP Teflon cable (200°C) 10.01-A01-E61-02-Length

For more cable option see Model 10.01 (specific cable harness).

Mounting Stud for M6 sensor thread
- M6 machine thread 191.01-06-06-1
- 1/4” 28 UNF machine thread 191.01-06-16-1
- M8 machine thread 191.01-06-08-1
- M10 machine thread 191.01-06-10-1

Mounting Stud for 1/4”28 UNF sensor thread
- M6 machine thread 191.01-16-06-1
- 1/4” 28 UNF machine thread 191.01-16-16-1
- M8 machine thread 191.01-16-08-1

Calibration, back to back, Frequency response (10 Hz-10 kHz), 4 pages 501.11
Calibration, back to back, single point., A4 certificates 501.01

**Repair**

Consult factory for replacement of connector in case of broken or bended pins. Repair of electronic is not possible.
**Configurations**

**Mil-C-5015 (B=1)**
- Pin A: (+)
- Pin B: (-)

Associated cable 10.01-A01-B22-06-Length: Red (+); White (-)
Associated cable 10.01-A01-B22-02-Length: Red (+); White (-)
Note: No temperature option available

**M12 glass seal (B=2)**
- Pin 1: not connected
- Pin 2: not connected or temperature output (T0 option)
- Pin 3: (-)
- Pin 4: (+)

Associated cable 10.01-A01-E02-31-Length
Black (+); Blue (-)
Temperature Output (T0 option) between Blue (-) and White (+)
Integral Cable B=5(CC-DD)
CC=01, 02 (PU, Teflon) : White (-); Red (+)
CC=03 (Radox): White N°1 (-); White N°2 (+)
CC=12 (Teflon): White (-); Red (+)
Temperature output between Black and White
CC=13 (Radox): White N°1 (-); White N°2 (+)
Temperature output between White N°3 and White N°1
CC=31 (PU): Blue(-); Black(+); Brown (NC)
Temperature output between White(+) and Blue(-)
NC: Not connected; (1) with T0 option

Integral cable with overbraid B=7(CC-DD)
Same wiring color as B=5

Integral cable with protection conduit B=8(CC-DD)
Same wiring color as B=5
Fig 1. Frequency Response, amplitude

Fig 2. Low Frequency response, amplitude

3. DC (Bias) deviation versus temperature

Fig 4. Sensitivity deviation versus temperature
Legal Information
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